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REMARKS

Reconsideration of this application is respectfully requested.

Claims 1-4 were rejected under 35 U.S.C. 103(a) for allegedly being unpatentable in view of CA '110, Sakuma and Suyama. Applicant respectfully traverses.

The presently claimed electronic toothbrush is characterized in that a potential overlaps in an n-type semiconductor, particularly when a solar battery of which the output exceeds 0.5 V and is less than 3.0 V is used. When such a solar battery is used, the excellent working effects described in (a) to (e) in the specification are achieved:

When teeth are brushed using the toothbrush under illumination of a fluorescent lamp in a washroom or the like, the battery is charged the whole time, and therefore, the level of the photocatalyst reaction in the n-type semiconductor does not lower as the time of use passes, and thus, the effects can presently be maintained.

With a primary battery, however, the voltage gradually decreases as the time of use passes, and the effects are lost without the user of the toothbrush noticing. This is also the same in the case of secondary batteries, which are chargeable.

Solar batteries are in the form of a thin plate, and therefore, it is not necessary for the grip of the toothbrush to be thick. Therefore, the manufacturing cost of the toothbrush is not greatly increased.

In general, the life of solar batteries is no less than 20 years, which is much longer than that of primary batteries and longer than that of secondary batteries. Thus, it is not necessary for the user of the toothbrush to frequently change batteries.

Since the life of the solar battery is long, the cost becomes low in various aspects. This is advantageous for providing toothbrushes at low cost. In the case of secondary batteries, which are chargeable, a charger is required, and in addition, power needs to be consumed for charging, and therefore, the cost becomes higher than in the case of a solar battery.

There is no risk with solar batteries of fluid leakage at the time of deterioration causing short-circuiting between electrodes, unlike with primary batteries and secondary batteries. In the case of primary batteries, it is necessary to remove the battery when the toothbrush is not used for a long period of time, which is troublesome. There is no such risk with solar batteries, which are thus optimal for toothbrushes.

The electronic toothbrush of CA '110 was developed by the present inventor, but, in practice, it was desirable to provide certain enhancements because, e.g., as disclosed in CA '110, the inventor planned to use a primary battery instead of a solar battery, and therefore, it was impossible to contain the battery within the thin grip of the toothbrush without fail. Though the inventor tried to make the grip of the toothbrush thicker so that a dry battery could be contained therein, providing a water-tight seal was extremely difficult. Therefore, it is necessary to attach a lid for opening and closing the grip of the toothbrush, and providing a complete and waterproof seal of the lid proved to be difficult. When water entered the body of the toothbrush, short-circuiting occurred and negatively affected the function of the toothbrush, and contacts would corrode and deteriorate.

In addition, though it is possible to use a mercury battery, which is compact in design, mercury batteries are expensive leading to increase consumer costs for the toothbrush.

A solar battery avoids the foregoing problems. It is comparatively easy to completely and functionally dispose a solar battery in thin film form in the grip of a toothbrush, and providing a seal is, therefore, not difficult. Thus, it is not necessary to attach a lid for opening and closing the grip as is necessary with a primary battery.

Sakuma provides a battery 5, but an n type semiconductor is not used, and the effects of the present invention are, therefore, not achieved.

Suyama uses a diode 9 and a piezo-electric element 4, which is completely different from the present invention, and does not disclose an n-type semiconductor or provide the effects of the present invention.

As set forth above, there was no motivation to combine the references as alleged by the Examiner, and the rejection is based only on hindsight, because one could not arrive at the present invention solely based on the teachings of the cited references.

In view of the foregoing, allowance is respectfully requested.

The Commissioner is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 50-0624, under Order No. NY-UNIUS-203.1-US. A duplicate copy of this paper is enclosed.

Respectfully submitted

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